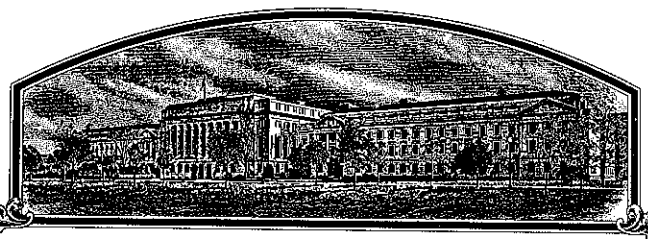

No. 9100077

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Farmers Marketing Corporation

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF eighteen YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT

'Cavalier'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this 29th day of April in the year of our Lord one thousand nine hundred and ninety-four.

Attest:

Kenneth A. Evers
Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Mike Espy
Secretary of Agriculture

APPROVAL EXPIRES 2-28-88

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

FORM APPROVED: OMB NO. 0581-0055

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S)
Farmers Marketing Corporation

2. TEMPORARY DESIGNATION
BR5702

3. VARIETY NAME
'Cavalier' AAA 25 Feb 1994

4. ADDRESS *(Street and No. or R.F.D. No., City, State, and Zip Code)*
P.O. Box 60578, Phx., AZ 85082-0578
5236 S. 40th St., Phx, AZ 85040

5. PHONE *(Include area code)*
(602) 437-4058

FOR OFFICIAL USE ONLY

PVPO NUMBER
9100077

6. GENUS AND SPECIES NAME
Triticum aestivum

7. FAMILY NAME *(Botanical)*
Gramineae

FILING
DATE
January 17, 1991
TIME
☐ A.M. ☐ P.M.

8. KIND NAME
Common Wheat

9. DATE OF DETERMINATION
1989
August, MAY New Letter 6 Mar 1994

FEES RECEIVED
AMOUNT FOR FILING
$ 2150.00
DATE
Jan. 17, 1991
AMOUNT FOR CERTIFICATE
$ 250.00
DATE
March 28, 1994

10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION *(Corporation, partnership, association, etc.)*
Corporation

11. IF INCORPORATED, GIVE STATE OF INCORPORATION
Arizona

12. DATE OF INCORPORATION

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS

Royce R. Richardson
P.O. Box 60578
Phoenix, AZ 85082-0578

Rex K. Thompson
P.O. Box 60578
Phoenix, AZ 85082-0578

PHONE *(Include area code)*:

14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED

a. ☒ Exhibit A, Origin and Breeding History of the Variety *(See Section 52 of the Plant Variety Protection Act.)*
b. ☒ Exhibit B, Novelty Statement.
c. ☒ Exhibit C, Objective Description of Variety *(Request form from Plant Variety Protection Office.)*
d. ☒ Exhibit D, Additional Description of Variety.
e. ☒ Exhibit E, Statement of the Basis of Applicant's Ownership.

15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? *(See Section 83(a) of the Plant Variety Protection Act.)*
☒ Yes *(If "Yes," answer items 16 and 17 below)* ☐ No

16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?
☒ Yes ☐ No

17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?
☒ Foundation ☒ Registered ☒ Certified

18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.?
☐ Yes *(If "Yes," give date)*
☒ No

19. HAS THE VARIETY BEEN RELEASED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES ?
☐ Yes *(If "Yes," give names of countries and dates)*
☒ No

20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT
Rex K Thompson
DATE
1-15-91

SIGNATURE OF APPLICANT
DATE

FORM LS-470 (3-86) *Edition of 7-84 obsolete.*

9100077

April 2, 1993

Alan A. Atchley, Plant Variety Examiner
Plant Variety Protection Office
U.S.D.A.
NAL Building, Room 500
10301 Baltimore Blvd.
Beltsville, MD 20705-2351

Subject: Plant Variety Protection NO. 9100077, wheat variety, BR5702.

AMA 25 Feb 1994

Dear Mr. Atchley,

In response to your letter of OCT 9, 1992 to Royce Richardson we, Rex Thompson and Jeff Klingenberg, of Farmers Marketing Corp. wish to present the following amendments to the PVP application for BR5702.

1. **Application Form**

Item 3 - We intend to market the variety under the name 'CAVALIER'

Item 9 - Date of determination was August 1989.

2. **Exhibit A**

a. Criteria used for selection - Yield and flour quality for bread making equal to or better than 'Yecora Rojo' and with equal or better agronomic acceptability than Yecora Rojo, 'Anza', and 'Yolo'. Selection was based on both analyzed numerical data, and observational, descriptive data.

b. Stability and uniformity have been observed for four generations.

c. Supporting data - see Appendix Tables 1 - 7.

d. Germplasm source information - attached 3 pages for further clarification on selection criteria.

Probability levels for significant differences are for mean separation by least significant differences at the P = 0.05 significance level. All LSD analyses are F-test protected.

2

Germplasm Source Information for BR5702

BR5702, a hard red spring bread wheat cultivar, was selected from the genetically broad-based, diverse population, Arizona Male Sterile Facilitated Recurrent Selection:1986(AZ-MSFRS-86). Quality Enhanced Semi-dwarf Hard Red Spring Wheat Germplasm was developed and released by the University of Arizona Agricultural Experiment Station in 1986.

This MSFRS population was developed over a period of 10 years (cycles), and 20 generations. The diverse population was derived by using genetic male sterile genotypes (from 'Siete Cerros'), and practicing MSFRS breeding to combine many common wheat genotypes and products of their hybridization from 1976-1985.

Large numbers (500-1000) of 50% controlled sib crosses and 50% top crosses were made each spring in the F2 population. Sibs, male and female, were selected for agronomic characteristics. Cultivars and lines used for top crosses were selected for yield and flour quality. Established hard red spring cultivars most frequently used in repeated top crosses from years 1981 to 1985 (cycles 6-10) included: 'LEN', JAMES', 'OLAF', 'WALDRON', 'OSLO', 'HERMOSILLO 77', 'PROBRED', 'PROBRAND 711', 'WESTBRED 906R', and 'YECORA ROJO'. To complete each cycle the F1 bulk crossed seed was increased in Montana each summer.

A copy of the University of Arizona Experiment Station, Notice of Release is attached.

9100077

EXHIBIT A

BREEDING HISTORY OF BR5702

BR5702 is a hard red spring wheat derived by Farmers Marketing Corporation from a F_2 head selection from a genetic male sterile facilitated recurrent selection population. The population was developed by the University of Arizona and released as AZ-MSFRS-86 Quality Enhanced Semi-dwarf Hard Red Spring Wheat Germplasm. A single plant from the F_3 headrow was harvested in Montana and increased in El Centro, California. The F_5, F_6 and F_7 generations were grown at Yuma, Arizona. Forty Eight heads were selected from the F_6 and grown as individual rows in 1989. Thirty Seven rows with uniform phenotype were harvested, bulked and increased at Mt. Vernon, Washington in the summer to form the present designated breeder seed which was seeded for foundation seed production in the spring of 1990.

BR5702 is uniform and stable. Genetic male sterile plants were present and rogued from the foundation seed increase at Roll, Arizona in 1990 at a frequency of less than 1 in 1,000. Because of seed set on unidentified male steriles, male sterility may continue to occur at that level subsequent to headrowing for more complete removal. Taller segregates were found and rogued from the foundation seed field at a rate of 1 in 500.

3. **Exhibit B**

Exhibit B Novelty Statement:

a. The novelty statement has been amended, re-written, and attached.

b. As appropriate and available quantitative characters have been statistically analyzed and are presented.

BR5702 is most similar to Yecora Rojo in plant type and appearance except for the following differences:

A. **Descriptor:**

Glume beaks (awns) of BR5702 are 21.3 mm long vs 10.3 mm for Yecora Rojo (Appendix Table 1.a). Variance components and mean separations were derived from 60 observations per variety. An additionl paired T-test analysis indicated highly significant $P(t \geq n_t) = 0.001$differences between BR5702 and Yecora Rojo for glume beak lengths (Appendix Table 1.b).

B. **Agronomic:**

Test weight of Yecora Rojo averaged 62.7 lbs bu^{-1} which was significantly (P= 0.05) higher by mean separation than BR5702 at 61.7 (Appendix Table 4).

Heading date (50%) is earlier for Yecora Rojo than BR5702 (Appendix Table 5).

C. **Quality**:

Yellowberry ratings were significantly higher for Yecora Rojo than BR5702 over four years, and six locations (Appendix Table 4).

D. **Disease Resistance:**

Significant differences (P<0.01) among test varieties occurred for **septoria blotch** rating at several locations years in California. Although BR5702 resistance did not exceed Tadinia, a resistant variety, it was significantly better (P=0.05) by mean separation than Yecora Rojo (Appendix Table 7).

4. **Exhibit C**

a. **C-16.....** 1. should be a **(1)** rather than a **(3)**which is an error.
2. also, was given a rounded **(1)** for AOSCA Certification Application.

5. b. **Disease Reaction:**

Information on field reaction to disease in California is attached. No insect or disease reaction was observed in Arizona trials. Field data for disease occurrence at California locations has been analyzed and presented in addition to septoria blotch resistance in the novelty statement.

Both BR5702 and Yecora Rojo are significantly (P=0.05) more resistant to **stripe rust** than susceptible varieties over two years, at three locations , and have equal resistance to stripe rust as Tadinia , a standard, resistant variety (Appendix Table 7).

Both BR5702 and Yecora Rojo were equally significantly (P=0.05) more susceptible to **leaf rust** when compared to resistant varieties Anza, and Yolo (Appendix Table 7).

BR5702, Anza, and Yecora Rojo were significantly (P=0.05) more susceptible to **black point** than BR5738, Tadinia, and Yolo over four years and three locations in California (Appendix Table 7).

6. **Exhibit D**

a. **Brush description** as given in Exhibit C is correct. We reached this conclusion after examining 1991 and 1992 seed, and AOSCA Certification Application.

b. Exhibit D should read:
Brush is of medium length and not collared. The crease is medium wide and deep with rounded cheeks.

7. **Differences between BR5702 and Anza**:

Anza **glume awns** are much shorter than BR5702 and Yecora Rojo. Anza reference: Registration of Anza (1984 ,Crop Sci. 24:827-828). Yecora Rojo reference: University of California Agronomy Progress Report No. 64. Anza glume awns are reported at 1-3 mm in length. Also refer to Appendix Table 1 for BR5702 length.

Anza is six to seven days later at **heading** than BR5702 (Appendix Table 5).

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Anza *cont.*

Anza is more resistant to **lodging** than BR5702 (Appendix Table 4).

Anza **test weight** is higher significantly higher than BR5702 (Appendix Table 4).

BR5702 had a significantly (P=0.05) higher **protein** content at 13.3% than Anza which resulted 11.7% when tested at the 12 % moisture base level (Appendix Table 6).

Anza is more resistant to **leaf rust** than BR5702 (Appendix Table 7).

8. **Differences between BR5702 and Tadinia**:

Tadinia was released by the University of California for multiple disease resistance.

Tadinia **plant height** is significantly (P=0.05) taller by 4 in., and it has more **days to maturity** date than BR5702 (Appendix Table 4).

Tadinia **leaf color** is yellow green where BR5702 is dark green.

Tadinia had significantly lower **protein** levels at 12.02 % and 11.07% compared to BR5702's 13.2% in 1990, and 11.7% respectively, in the 1991 - 1992 combined analysis (Appendix Table 6).

Tadinia is slightly more resistant to **leaf rust**, and significantly (P=0.05) more resistant to **septoria** than BR5702. However, BR5702 maintains equal resistances with Tadinia to **stripe rust**, and **BYVD** (Appendix Table 7).

Tadinia is significantly (P=0.05) less susceptible to **black point** than BR5702 (Appendix Table 7).

9. **Differences between BR5702 and Spillman:**

Observation, phenotypic differences: derived from Maricopa, AZ field notes

Spillman is daylight insensitive and BR5702 is daylight sensitive. Spillman is much later to maturity (up to three weeks) than BR5702 in Central Arizona under flood irrigation (Table 8).

Spillman flag leaf is blue-green and not recurved. BR5702 is green and recurved.

Spillman *cont.*

Spillman, grown in Arizona, is 10 inches taller than BR5702 and lodged approximately 80% vs. trace lodging for BR5702 under similar field conditions.

Spillman produces significantly (P=0.05) lower yields than BR5702 as suggested by one and two year combined yield data collected from Maricopa, Arizona (Appendix Table 3).

10. **Differences Between BR5702 and Shasta:**

Shasta is an obsolete California variety --not available for difference comparison. According to University of California-Davis Progress Report No.149. May, 1984, Shasta is five to 11 inches taller than Yecora Rojo and four to 10 days earlier than Yecora Rojo. This indicates that Shasta would be at least five to six inches taller and seven days earlier than BR5702.

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Farmers Marketing Corporation Amendment to 1992 PVP application for common wheats--'BR5702' and 'BR5738'.

Experimental Design and Statistical Analysis

Data reported on multiple years and locations of California Regional testing, and two year University of Arizona Maricopa Ag. Center.

Standard rating scale for disease, lodging, and yellow berry are as follows:

1 = 0-3%, 2 = 4-14%, 3 = 15-29%, 4 = 30-49%, 5 = 50-69%, 6 = 70-84%, 7 = 85 - 95%, 8 = 96-100% of the response trait.

Analysis of variance components and mean separations were analyzed on one, two and three factor randomized complete block designs. Variance components included years, replications, and treatments (varieties).

Full Model for obtaining appropriate mean squares:

$$Y_{kij} = \mu \pm t_k \pm r_j \pm a_{kj} \pm g_i \pm tg_{ki} \pm e_{kji}$$

Where:

Y_{kij} = the phenotypic measurement of the trait of the ith individual of the ith location (replication).

μ = the grand mean of all entries.

t_k = the effect of the kth block (year), k = 1, 2...,t.

r_j = the effect of the jth location, j = 1,2...,r.

a_{kj} = the random environmental effect associated with the jth location in the kth year (error a).

g_i = the effect of the ith line (variety), i = 1,2,....,g

tg_{ki} = the random environmental effect associated with the ith individual in the kth year (error b).

e_{kji} = the random effect associated with the ith individual at the jth location in the kth year (pooled error c).

Direct variety comparisons were done by the Student's paired observation *t'*. Results are reported only for the glume beak analysis in the novelty statement.

Data from California Regional Testing were provided to us in the form of mean separations by least significant differences. Therefore, locations each having four replications were appropriately used as replications nested within each year. Although only one genotypic value was reported from each location it was considered the best estimator of that variety. All data were considered normally distributed with adequate buffering for varietal means obtained from locations. For several traits, the increase in locations rather than replication within location was better for determining genotypic performance for the given regions and agronomic practices.

Data from Arizona testing are for single location and two years. Each experimental design was a randomized complete block. Factor analysis for ANOVA estimates were made. F-test protected mean separations by least significant differences are reported for both California regional data and Arizona data.

We do need protection for BR5702 (Cavalier). You have given April 9, 1993 as the deadline. If the data presented are insufficient for PVP acceptance, we do request a 120 day extension to process 1993 data and to examine a number of other differential descriptors.

Sincerely,

Rex K Thompson

Rex K. Thompson

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Appendix Table 1.a. Mean glume beak measurements among BR5702, BR5738, BR8631, and Yecora Rojo. Means reported were derived from 60 measurements per variety.

Entry	Glume beak length (mm)
BR5702	21.3
BR5738	9.1
BR8631	14.3
Yecora Rojo	10.3
LSD (P=0.05)	1.08
C.V. (%)	20.5

Appendix Table 1.b. T-test† for the hypothesis "MEAN of LINE 1 = MEAN of LINE 2" for glume beak lengths among four hard red spring wheat lines. Sixty paired observations per line were made for glume beak lengths.

t' =

	BR5702	BR5738	BR8631	Yecora Rojo
BR5702		-21.1 **	10.6 **	18.7 **
BR5738			11.9 **	-3.5 **
BR8631				9.2 **
Yecora Rojo				

† T-test analysis was based on paired observations (t').

** t' values are significant when $P(t' \geq n_t) = 0.001$.

//

Appendix Table 2. Mean comparisons for grain yield among six hard red spring wheat varieties entered in the California Regional Trials.

Entry	1989-1992 4yr, 6 loc.†	1990-1992 Sac. Valley, yr, 4 loc.††	San J. Valley 3 yr, 3 loc.†††	Imp. Valley 3 yr, 1 loc§	CA Rainfed 3 yr, 1 loc.§§
BR5702	6561	6650	6060	9800	3160
BR5738	5613	5880	5530	8930	2710
Y. Rojo	6313	6450	5940	9190	3270
Yolo	6953	6530	6230	8720	2460
Anza	6660	6470	5780	8700	2500
Tadinia	6869	6180	5270	7220	1980
LSD (P=0.05)	267	200	210	740	260
C.V. %	7.0	7.7	10.8	10.08	13.8

†Four years at six California locations.
††Sacramento Valley locations.
†††San Joaquin Valley locations.
§Imperial Valley.
§§Rainfed locations, one location per year. Locations included: San Luis Obispo, and Yolo, CA.

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Appendix Table 3. Mean comparisons for lbs ac^{-1} grain yield among 7 hard red spring wheat varieties for 1991 and 1992 Central Arizona Testing. Trials were conducted at the University of Arizona Maricopa Ag. Center.

	Grain Yield (lbs ac^{-1})		
Entry	1991	1992	1991-1992 Combined
BR5702	8262	7692	7977
BR5738	8087	7983	8035
Y. Rojo	7926	7004	7465
Yolo	9806	7626	8718
Anza	7336	6327	6831
Len	5870	5260	5565
Spillman	5908	5260	5799
LSD (P=0.05)	1258.0	1123.0	784.5
C.V.%	11.1	11.1	10.8

Appendix Table 4. Mean comparison for agronomic growth parameters among six hard red spring wheat varieties from the California Regional Trials. Analysis reported is from data taken over four years, and six locations.

Entry	Test weight (bu. wt.)	Kernel Wt. g 1000^{-1}	Plant Ht. (in.)	Yellow Berry (Std. rating)	lodging (Std. rating)
BR5702	61.7	37.8	36.3	2.1	3.6
BR5738	62	38.6	36.7	3.7	2.5
Y. Rojo	62.7	41.0	35.8	4.4	1.5
Yolo	63	41.7	36.1	3.5	1.8
Anza	62.5	40.2	37.4	4.2	1.2
Tadinia	61.2	38.5	40.1	1.8	1.6
LSD (P=0.05)	.37	.94	.65	.63	.48
C.V.%	1.03	4.13	3.15	38.9	41.8

Appendix Table 5. Mean comparisons for days to first heading and maturity among six varieties in three years at three locations. Data were analyzed from the California Regional Trials.

Entry	Days to Heading	Days to Maturity
BR5702	61.0	110.2
BR5738	62.1	109.7
Y. Rojo	59.7	110.8
Yolo	66.7	114.7
Anza	67.9	116.8
Tadinia	66.7	114.5
LSD (P=0.05)	.75	2.3
C.V.%	1.22	1.68

Appendix Table 6. Mean comparisons for hard red spring bread quality traits among six varieties tested in the California Regional Trials.

	Protein		Loaf Volume
Entry	1990†	1991-1992††	1989-1992†††
BR5702	13.30	11.68	1240
BR5738	13.92	12.28	1207
Y. Rojo	12.90	11.77	1187
Yolo	11.57	10.77	1152
Anza	11.71	10.50	943
Tadinia	12.02	11.07	913
LSD (P=0.05)	.60	.70	227
C.V.%	3.2	7.5	24.9

†Samples tested were from four California locations by the California Wheat Commission.
††Two year, six California location samples.
†††Four year, three California location samples.

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Appendix Table 7. Mean comparisons based on standard rating scale for disease resistance among six, and 10 hard red spring wheat varieties tested in the California Regional Trials.

Entry	Septoria†	Stripe Rust††	Leaf Rust†††	BYVD§	Black Point§§
BR5702	1.20	1.05	2.08	1.35	1.31
BR5738	2.10	1.13	1.98	1.21	1.00
Y. Rojo	1.60	1.00	2.02	1.34	1.40
Yolo	1.10	1.00	1.32	1.24	1.00
Anza	1.20	1.10	1.52	1.24	1.43
Tadinia	1.00	1.00	1.82	1.26	1.00
Probred	NI§§§	1.50	NI	NI	NI
QT588	NI	1.90	NI	NI	NI
UC843	NI	1.60	NI	NI	NI
BR5450	NI	1.77	NI	NI	NI
LSD (P=0.05)	.21	.61	.50	NS	.30
C.V. %	16.1	40.6	21.1	27.6	30.1

†Three year, three locations, six variety analysis.
††Two year, three locations, 10 variety analysis.
†††One year, 1992, five location, six variety analysis.
§ Four year, three location, six variety analysis.
§§ Four year ,three location, six variety analysis.
§§§ Not included in analysis.

Appendix Table 8. Mean comparisons for grain test weight, plant height, and yellowberry rating among six hard red spring wheat varieties grown in the 1992 Maricopa, Arizona yield trial.

	1992		
Entry	Test wt. (bu. wt.)	Plant Height	Yellowberry
BR5702	64.0	35.7	1
BR5738	64.0	29.0	1
Yecora Rojo	64.7	34.7	1.3
Len	60.0	43.0	2.0
Yolo	63.5	41.5	4.0
Spillman	55.0	46.0	2.0
Mean	61.9	38.3	1.9
σ_{n-1}	3.8	6.3	1.1

16

FORM APPROVED: OMB NO. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK AND SEED DIVISION
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(Wheat)

OBJECTIVE DESCRIPTION OF VARIETY
WHEAT (*TRITICUM SPP.*)

INSTRUCTIONS: *See Reverse.*

NAME OF APPLICANT(S)
Farmers Marketing Corporation

ADDRESS (*Street and No. or R.F.D. No., City, State, and ZIP Code*)
P.O. Box 60578, Phoenix, AZ 85082-0578
5236 S. 40th St., Phoenix, AZ 85040

FOR OFFICIAL USE ONLY
PVPO NUMBER
9100077
VARIETY NAME OR TEMPORARY DESIGNATION
BR5702

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (e.g. [0][8][9] or [0][9]) when number is either 99 or less or 9 or less.

1. KIND:
[1] 1 = COMMON 2 = DURUM 3 = EMMER 4 = SPELT 5 = POLISH 6 = POULARD 7 = CLUB

2. TYPE:
[1] 1 = SPRING 2 = WINTER 3 = OTHER (*Specify*) _____
[2] 1 = SOFT 2 = HARD 3 = OTHER (*Specify*) _____
[2] 1 = WHITE 2 = RED 3 = OTHER (*Specify*) _____

3. SEASON - NUMBER OF DAYS FROM EMERGENCE TO:
[1][1][4] FIRST FLOWERING
[1][2][2] LAST FLOWERING

4. MATURITY (*50% Flowering*):
[ ][ ] NO. OF DAYS *EARLIER* THAN .....
[0][2] NO. OF DAYS *LATER* THAN .....
[7] 1 = ARTHUR 2 = SCOUT 3 = CHRIS 4 = LEMHI 5 = NUGAINES 6 = LEEDS
7 = Yecora Rojo

5. PLANT HEIGHT (*From soil level to top of head*):
[0][8][2] CM. HIGH
[0][4] CM. TALLER THAN .....
[ ][ ] CM. SHORTER THAN .....
[7] 1 = ARTHUR 2 = SCOUT 3 = CHRIS 4 = LEMHI 5 = NUGAINES 6 = LEEDS
7 = Yecora Rojo

6. PLANT COLOR AT BOOTING (*See reverse*):
[2] 1 = YELLOW GREEN 2 = GREEN 3 = BLUE GREEN

7. ANTHER COLOR:
[1] 1 = YELLOW 2 = PURPLE

8. STEM:
[1] Anthocyanin: 1 = ABSENT 2 = PRESENT
[2] Hairiness of last internode of rachis: 1 = ABSENT 2 = PRESENT
[0][4] NO. OF NODES (*Originating from node above ground*)
[2] Waxy bloom: 1 = ABSENT 2 = PRESENT
[1] Internodes: 1 = HOLLOW 2 = SOLID
[1][5] CM. INTERNODE LENGTH BETWEEN FLAG LEAF AND LEAF BELOW

9. AURICLES:
[1] Anthocyanin: 1 = ABSENT 2 = PRESENT
[2] Hairiness: 1 = ABSENT 2 = PRESENT

10. LEAF:
[2] Flag leaf at booting stage: 1 = ERECT 2 = RECURVED 3 = OTHER (*Specify*): _____
[1] Flag leaf: 1 = NOT TWISTED 2 = TWISTED
[1] Hairs of first leaf sheath: 1 = ABSENT 2 = PRESENT
[2] Waxy bloom of flag leaf sheath: 1 = ABSENT 2 = PRESENT
[1][5] MM. LEAF WIDTH (*First leaf below flag leaf*)
[1][0] CM. LEAF LENGTH (*First leaf below flag leaf*):

FORM LMGS 470-6 (6-82) (Formerly Form LPGS 470-6 (3-79), which may be used)

11. HEAD:

[1] Density: 1 = LAX 2 = DENSE

[1] Shape: 1 = TAPERING 2 = STRAP 3 = CLAVATE 4 = OTHER (Specify) _____

[4] Awnedness: 1 = AWNLESS 2 = APICALLY AWNLETED 3 = AWNLETED 4 = AWNED

[1] Color at maturity: 1 = WHITE 2 = YELLOW 3 = PINK 4 = RED 5 = BROWN 6 = BLACK 7 = OTHER (Specify): _____

[1][2] CM. LENGTH. [1][6] MM. WIDTH

12. GLUMES AT MATURITY:

[3] Length: 1 = SHORT (CA. 7 mm.) 2 = MEDIUM (CA. 8 mm.) 3 = LONG (CA. 9 mm.)

[3] Width: 1 = NARROW (CA. 3 mm.) 2 = MEDIUM (CA. 3.5 mm.) 3 = WIDE (CA. 4 mm.)

[4] Shoulder shape: 1 = WANTING 2 = OBLIQUE 3 = ROUNDED 4 = SQUARE 5 = ELEVATED 6 = APICULATE

[3] Beak: 1 = OBTUSE 2 = ACUTE 3 = ACUMINATE

13. COLEOPTILE COLOR:

[1] 1 = WHITE 2 = RED 3 = PURPLE

14. SEEDLING ANTHOCYANIN:

[2] 1 = ABSENT 2 = PRESENT

15. JUVENILE PLANT GROWTH HABIT:

[3] 1 = PROSTRATE 2 = SEMI-ERECT 3 = ERECT

16. SEED:

[3] Shape: 1 = OVATE 2 = OVAL 3 = ELLIPTICAL

[3] Cheek: 1 = ROUNDED 2 = ANGULAR

[2] Brush: 1 = SHORT 2 = MEDIUM 3 = LONG

[1] Brush: 1 = NOT COLLARED 2 = COLLARED

[ ] Phenol reaction (See Instructions): 1 = IVORY 2 = FAWN 3 = LT. BROWN 4 = BROWN 5 = BLACK

[3] Color: 1 = WHITE 2 = AMBER 3 = RED 4 = PURPLE 5 = OTHER (Specify) _____

[0][7] MM. LENGTH [0][3.5] MM. WIDTH [4][5] GM. PER 1000 SEEDS

17. SEED CREASE:

[2] Width: 1 = 60% OR LESS OF KERNEL 'WINOKA' 2 = 80% OR LESS OF KERNEL 'CHRIS' 3 = NEARLY AS WIDE AS KERNEL 'LEMHI'

[2] Depth: 1 = 20% OR LESS OF KERNEL 'SCOUT' 2 = 35% OR LESS OF KERNEL 'CHRIS' 3 = 50% OR LESS OF KERNEL 'LEMHI'

18. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

[0] STEM RUST (Races) _____ [0] LEAF RUST (Races) _____ [0] STRIPE RUST (Races) _____ [0] LOOSE SMUT

[0] POWDERY MILDEW [0] BUNT [ ] OTHER (Specify) _____

19. INSECT: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

[0] SAWFLY [0] APHID (Bydv.) [0] GREEN BUG [0] CEREAL LEAF BEETLE

[ ] OTHER (Specify) _____ HESSIAN FLY RACES: [0] GP [0] A [0] B [0] C [0] D [0] E [0] F [0] G

20. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant tillering	Yecora Rojo	Seed size	Yecora Rojo
Leaf size	Yecora Rojo	Seed shape	Yecora Rojo
Leaf color	----	Coleoptile elongation	----
Leaf carriage	Yecora Rojo	Seedling pigmentation	Yecora Rojo

INSTRUCTIONS

GENERAL: The following publications may be used as a reference aid for the standardization of terms and procedures for completing this form:

(a) E.W. Briggle and L. P. Reitz, 1963, Classification of Triticum Species and Wheat Varieties Grown in the United States. Technical Bulletin 1278, United States Department of Agriculture.

(b) W.E. Walls, 1965, A Standardized Phenol Method for Testing Wheat Seeds for Varietal Purity, contribution No. 28 to the handbook of seed testing prepared by the Association of Official Seed Analysts. *(See attachment.)*

EXHIBIT D

ADDITIONAL DESCRIPTION

BR5702 is a early maturing hard red spring milling wheat with short stiff straw and good standability. Juvenile growth is erect. Heads are tapered, lax, awned and white. Glume shoulders are square with accuminate beaks, typically 15 mm long. Seeds are large, elliptical, hard and red. Brush is short and not collared. Crease is medium wide and deep with variably rounded cheeks.

Grain test weight, and kernel size and weight are very good and similar to Yecora Rojo. Heading has averaged 2 days later and combine-ready maturity 1 day later than Yecora Rojo. Plants are 4 cm taller at maturity but standability and lodging resistance are similar.

Yield advantage over Yecora Rojo for 24 variable location years has been 4 percent. Yield advantage may be extended to 11% or more under conditions of high input and high yields, i.e. El Centro, California. Bread flour characteristics are much like those of Yecora Rojo, with BR5702 having a larger loaf volume and higher protein content.

BR5702 is adapted to the irrigated areas of Arizona and California where Yecora Rojo is grown and is well suited for bakery bread flour for local use or export where Yecora Rojo is marketed.

9100077

EXHIBIT E

STATEMENT OF THE BASIS OF APPLICANTS OWNERSHIP

Regular employees of the applicant, Farmers Marketing Corporation, have developed BR5702.

Farmers Marketing Corporation is the proprietory owner and intended commercial user of the variety.

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EXHIBIT F

AGRONOMIC AND QUALITY DATA

Table 1 Average Yields by Areas for 24 Location Years

	Average yield in pounds per acre				
	BR5702	Yecora Rojo	BR5738	Baker	Yolo
Northern California 10 location years	5348	5168	5317	5126	5452
Southern California-West 7 location years	5761	5523	5380	5634	5810
Southern California-East El Centro - 2 years	8275	7435	7365	7900	7040
Arizona 5 location years	6638	6599	6886	6542	(6875)
Overall Averages for 24 Location Years	6002	5759	5843	5676	5946

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Table 2 Test Weights (14 location years)

	Test weight in pounds per bushel				
	BR5702	Yecora Rojo	BR5738	Baker	Yolo
Sacaton, AZ 1988	64.0	65.0	61.5	----	----
Maricopa, AZ 1989	62.0	64.5	63.5	64.5	64.0
Maricopa, AZ 1990	62.0	62.0	64.0	64.0	63.0
U of CA El Centro 1989	62.5	62.5	61.5	63.0	63.0
U of CA El Centro 1990	61.5	61.0	60.3	61.3	61.8
U of CA Davis 1989	61.0	62.3	63.4	62.5	63.9
U of CA Las Banos 1989	63.4	64.5	62.4	63.1	63.3
U of CA Los Banos 1990	62.1	62.5	61.4	61.1	63.2
U of CA Chico 1989	61.2	61.9	61.2	62.1	62.2
U of CA Meridian 1989	62.1	62.1	62.3	62.1	62.8
U of CA Tyler Island 1989	63.0	63.6	63.2	63.4	63.9
U of CA Stratford 1989	61.6	62.8	60.6	61.3	61.8
U of CA Kern Lake 1989	61.7	62.6	60.1	62.6	61.6
U of CA Santa Ynez 1989	60.3	60.0	57.5	60.7	61.0
Average	62.0	62.7	61.6	62.4	62.8

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Table 3 Seed Weight (17 location years) University of California Regional Trials

	Seed weight in grams per 1,000 seeds				
	BR5702	Yecora Rojo	BR5738	Baker	Yolo
U of CA El Centro 1989	49.5	46.3	41.9	42.5	40.4
U of CA Davis 1989	42.2	43.0	41.3	44.7	36.1
U of CA Meridian 1989	46.5	46.6	39.1	43.0	35.6
U of CA Chico 1989	46.0	46.0	44.0	46.0	36.0
U of CA Tyler Island 1989	47.6	45.6	43.0	46.6	36.8
U of CA Los Banos 1989	48.0	48.2	39.5	45.0	38.5
U of CA Stratford 1989	39.1	39.7	33.0	36.7	29.0
U of CA Kern Lake 1989	43.0	46.0	37.0	45.0	35.0
U of CA Santa Ynez 1989	47.6	33.1	31.9	37.3	33.5
U of CA El Centro 1990	40.8	40.8	34.7	39.8	32.3
U of CA Davis 1990	44.9	44.5	43.1	44.5	34.9
U of CA Meridian 1990	42.2	41.8	39.8	42.4	32.5
U of CA Chico 1990	45.4	44.7	41.1	43.5	36.3
U of CA Tyler Island 1990	44.5	45.5	40.0	40.5	35.7
U of CA Los Banos 1990	44.0	41.2	37.8	39.8	31.7
U of CA Corcoran 1990	41.1	42.7	37.2	37.9	33.0
U of CA Kern Lake 1990	43.7	43.8	39.6	43.9	37.6
Average	44.5	43.5	39.1	42.3	35.0

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Table 4 Plant Heights (20 location years)

	Plant heights in inches				
	BR5702	Yecora Rojo	BR5738	Baker	Yolo
Maricopa, AZ 1989	35	33	30	---	---
Maricopa, AZ 1990	32	30	24	29	35
Yuma, AZ 1989	37	36	35	---	39
U of CA Imperial 1989	30	29	24	30	36
U of CA Davis 1989	33	31	33	33	33
U of CA Meridian 1989	38	37	33	36	39
U of CA Chico 1989	35	33	30	33	36
U of CA Tyler Isle 1989	36	33	29	35	40
U of CA Los Banos 1989	35	33	28	34	39
U of CA Stratford 1989	31	30	25	28	34
U of CA Kern Lake 1989	33	30	27	31	35
U of CA Santa Barbara 1989	29	26	22	27	33
U of CA Imperial 1990	30	29	25	29	36
U of CA Davis 1990	37	35	30	34	39
U of CA Stratford 1990	29	28	24	28	34
U of CA Kern Lake 1990	38	37	33	37	43
U of CA Tyler Isle 1990	35	33	29	34	37
U of CA Chico 1990	33	32	32	33	39
U of CA Meridian 1990	37	38	34	35	43
U of CA Los Banos 1990	33	33	27	30	41
Average, 20 Location Years	33.8	32.2	28.7	32.5	37.4

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Table 5 Lodging (18 location years)

	Lodge rating based on percent lodged at maturity*				
	BR5702	Yecora Rojo	BR5738	Baker	Yolo
Sacaton, AZ 1988	1.0	1.0	1.0	--	--
Maricopa, AZ 1989	1.0	1.0	1.0	1.0	4.4
Maricopa, AZ 1990	3.5	1.0	1.0	1.2	3.9
Yuma, AZ 1989	1.0	1.2	1.0	1.0	1.5
U of CA El Centro 1989	1.0	1.0	1.0	1.0	3.5
U of CA Davis 1989	7.3	7.0	2.0	7.0	5.5
U of CA Meridian 1989	3.5	4.0	1.5	5.0	2.3
U of CA Chico 1989	1.8	1.5	1.0	1.8	1.8
U of CA Tyler Isle 1989	1.8	1.0	1.0	1.5	1.3
U of CA Stratford 1989	1.3	1.8	1.0	1.5	1.0
U of CA Kern Lake 1989	1.0	1.0	1.0	1.0	1.0
U of CA Santa Ynez 1989	1.0	1.0	1.0	1.5	1.0
U of CA El Centro 1990	1.0	1.0	1.0	1.3	2.0
U of CA Davis 1990	3.0	2.0	1.0	3.5	1.0
U of CA Kern Co. 1990	1.0	1.0	1.0	1.0	1.8
U of CA Delta 1990	4.3	2.8	1.0	3.5	3.3
U of CA Sutter Co. 1990	4.5	4.5	3.5	5.0	4.0
U of CA Butte Co. 1990	1.5	3.5	1.0	2.5	2.3
Average	2.3	2.1	1.2	2.2	2.4

* Rating of 1-8: 1 = 0-3%; 2 = 4-14%; 3 = 15-29%; 4 = 30-49%; 5 = 50-69%; 6 = 70-84%; 7 = 85-95%; 8 = 96-100%

Table 6 Maturity (50% headed)

	Days to heading from January 1				
	BR5702	Yecora Rojo	BR5738	Baker	Yolo
Sacaton, AZ 1988	97	94	101	--	--
Maricopa, AZ 1989	82	78	82	78	81
U of CA El Centro 1989	78	77	78	76	84
U of CA Davis 1989	99	99	100	100	107
Maricopa, AZ 1990	120	119	124	118	124
U of CA El Centro 1990	82	82	85	84	88
U of CA Davis 1990	104	102	105	100	110
Average	95	93	96	93	99

Table 7 Maturity (harvest)

	Days to maturity from January 1				
	BR5702	Yecora Rojo	BR5738	Baker	Yolo
Sacaton, AZ 1988	166	164	170	--	--
Maricopa, AZ 1989	138	135	139	132	143
U of CA El Centro 1989	119	119	115	117	124
U of CA Davis 1989	140	142	153	141	151
Maricopa, AZ 1990	157	154	157	156	163
U of CA El Centro 1990	128	127	126	129	131
U of CA Davis 1990	148	150	147	148	157
Average	142	141	144	137	146

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Table 8 Grain Protein (10 location years)

	Grain protein in percent				
	BR5702	Yecora Rojo	BR5738	Baker	Yolo
Sacaton, AZ 1988	12.87	12.80	13.90	---	---
Yuma, AZ 1988	14.28	13.49	14.83	---	---
U of CA El Centro 1989	13.20	13.00	13.30	13.70	11.40
U of CA Davis 1989	14.08	14.56	14.00	14.27	11.88
U of CA Chico 1989	12.69	12.48	13.13	12.32	9.96
U of CA Stratford 1989	14.05	12.77	14.16	13.59	12.60
U of CA Meridian 1989	9.74	10.47	11.28	10.20	9.18
U of CA Tyler Island 1989	13.91	13.20	14.68	14.74	11.58
U of CA Kern Lake 1989	14.36	13.93	14.08	14.48	12.76
Yuma, AZ 1989	15.46	15.16	---	---	---
Average	13.47	13.19	13.70	13.33	11.34

Table 9 Quality Analysis of 1989 University of California, Butte County Common Wheat Trial USDA Western Wheat Quality Laboratory, Pullman, Washington

	BR5702	Yecora Rojo	BR5738	Baker	Yolo
Test Weight-Lbs per bu	63.1	63.0	63.0	63.5	63.7
Flour Yield - %	71.8	73.3	71.1	72.3	73.2
Flour Protein - %	10.1	9.4	10.5	9.9	8.3
Mixograph Strength - Type	8M	8M	8M	8M	3M
Mixing Time (min)	3.8	3.8	3.4	3.7	1.7
Loaf Volume - CC	910	830	890	855	765
Bread Crumb Grain - Score	3	2	4	2	8
Bake Absorption - %	62.4	61.0	63.7	63.0	59.5
Bake Score	61.3	60.6	62.2	62.1	60.2

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Table 10 Quality Evaluation (8 location years)

Variety Company	Grain Source	Test Weight Lbs/Bu	Grain Protein %	FARINOGRAPH Abs.	Peak	Stab	MTI	Loaf Volume CC	Grain	Overall Rating
BR5702										
1 Pillsbury	1988 Yuma	62.8	14.40	65.4	6.0	11.8	30	(630)	--	--
2 Baystate	1987 Yuma	63.0	13.14	65.6	7.5	11.0	25	3300	good-	fair
3 Baystate	1988 Sact'n	63.5	14.28	64.6	9.0	15.5	10	3600	good	good
4 Baystate	1989 Yuma	62.0	15.46	66.4	9.5	25.0	25	3200	sl opn	good-
5 Baystate	1989 Mar'pa	61.0	14.40	63.6	8.0	25.0	--	3275	good	good
6 Baystate	1990 Mar'pa	60.5	14.70	61.7	11.5	21.0	--	3600	good	good
7 Baystate	1990 LaPzCo	63.0	14.20	61.8	8.5	21.0	--	3600	good	good
8 Baystate	1990 Marana	64.0	13.00	61.3	10.5	25.0	--	3350	good-	good-
Average		62.5	14.20	63.8	8.8	19.4	(22.5)	3418	--	--
Yecora Rojo										
1 Pillsbury	1988 Yuma	64.0	12.60	66.1	1.0	2.5	75	(563)	--	--
2 Baystate	1987 Yuma	63.5	13.49	67.4	7.0	9.5	15	3300	good-	good
3 Baystate	1988 Sact'n	64.0	12.54	64.1	10.5	22.0	5	2950	sl opn	poor
4 Baystate	1989 Yuma	62.5	15.16	66.1	12.0	25.0	15	3300	sl opn	good-
5 Baystate	1989 Mar'pa	64.0	14.80	67.3	12.0	21.5	--	2950	open	poor+
6 Baystate	1990 Mar'pa	62.0	15.20	64.5	12.0	25.0	--	3600+	good	good
7 Baystate	1990 LaPzCo	63.5	14.30	61.0	9.5	25.0	--	3475	good	good
8 Baystate	1990 Marana	64.5	11.70	62.5	10.0	25.0	--	3175	open	poor+
Average		63.5	13.72	64.9	9.3	19.4	(27.5)	3250	--	--

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Table 11 Quality Analysis 1990 by California Wheat Commission Laboratory

	BR5702	Yecora Rojo	BR5738	Baker	Yolo
Protein %	13.06	12.86	13.36	13.12	10.84
Test Weight Lbs/Bu	62.70	62.80	62.90	62.40	63.50
Weight 1,000 Kernals-gms	43.00	42.13	41.20	41.40	32.79
Flour Yield %	68.40	66.60	69.70	71.00	74.10
Wet Gluten	29.46	29.25	30.56	30.35	27.05
Farinograph					
Absorption %	59.40	60.20	59.60	59.40	58.60
Arrival Min	1.50	1.75	1.50	2.00	1.75
Mixin Time Min	25.50	22.25	14.50	26.00	3.50
Peak Min	12.00	10.00	6.00	11.00	3.50
Stability Min	27.00	24.00	16.00	28.00	10.00
MTI	20	20	20	10	30
Loaf Volume CC	970	1010	930	875	845
Grain and Texture	sl open	close	sl open	close	close
Score	5	5	4	2	1

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